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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,195	09/26/2003	Satoshi Tanaka	BJS-914-173	4478

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EXAMINER	
BARTON, JEFFREY THOMAS	
ART UNIT	**PAPER NUMBER**
1795	

MAIL DATE	DELIVERY MODE
11/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/670,195	TANAKA ET AL.	
	Examiner	Art Unit	
	Jeffrey T. Barton	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-24* is/are pending in the application.

4a) Of the above claim(s) *4-6,14-16 and 19-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7-13,17 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 04 September 2007 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 03 May 2007

2. All previous rejections are maintained.

Election/Restrictions

3. Newly submitted claims 14-16 and 19-24 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the cells of the elected claims can be made by a method that does not involve printing.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 14-16 and 19-24 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

4. Applicant's amendment causes the requirement for election between species A-C made in the original requirement for restriction/election (Mailed 05 February 2007) to no longer apply. Accordingly, claims 2, 3, 10, and 11 are rejoined and will be examined along with the originally elected claims.

5. Claims 4-6, 14-16, and 19-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention. Claim 7 has been cancelled. Claims 1-3, 8-13, 17, and 18 are drawn to the elected invention and will be examined.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-3, 8-13, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al (US 4,256,513) in view of Gonsiorawski et al. (US 5,074,920)

Regarding claims 1, 8, and 9, Yoshida et al teach a solar cell having an electrode made from a silver paste having powdery glass with an average grain size below 1 micrometer. (Column 6, lines 27-64) Yoshida et al also disclose soldering electrode leads to this electrode (Figure 1C, Column 6, lines 64-67), but are silent concerning the solder composition.

Regarding claims 2, 10, 12, and 17, 0.5 grams of glass frit are included in a total of 12 grams of paste, which corresponds to the glass frit being present at about 4%, by mass in Embodiment 1. (Column 6, lines 27-39) Yoshida et al also teach a preferred glass frit percentage of 7-9 % by weight. (Column 11, lines 9-14)

Regarding claims 3, 11, 13, and 18, Yoshida et al disclose using their paste to prepare electrodes over 100 micrometers thick. (Column 14, lines 1-5)

Yoshida et al do not explicitly disclose using a lead-free solder as solder 6 that connects lead 7 to the grid electrode 4, nor do they explicitly disclose

connection of plural cells by interconnectors to form the claimed string and module.

Gonsiorawski et al teach the advantage of using a 96-98 % tin/2-4 % silver solder to connect leads to electrodes made from fired silver paste, in that thermal stability of the resulting connections is improved. (Abstract, Column 3, lines 49-58, Column 4, lines 50-67) In addition, Gonsiorawski teach using such soldered connections to connect plural cells in strings and modules as claimed. (Column 1, lines 9-19; Column 4, lines 62-67)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Yoshida et al by specifically using a 96-98 % tin/2-4 % silver solder to connect the lead 7 to the grid electrode 4, as taught by Gonsiorawski et al, because Gonsiorawski et al teach that use of this solder leads to improved thermal stability of the bonds. (Abstract; Column 3, lines 49-58)

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Yoshida et al by specifically using these connections to connect multiple cells in series strings to form solar modules, as taught by Gonsiorawski et al, because connection of cells in series strings increases the output voltage, which is necessary for many conventional electrical loads. A skilled artisan would have known to select a suitable number of cells (Which have output voltages of less than 1 volt; e.g. Figure 2 of Yoshida et al) to be connected in series in order to provide whatever module output voltage is desired.

Undue weight cannot be given to the instant limitation to a paste electrode "which has been dip-coated" with lead-free solder, since this limitation is drawn to the making of the claimed product by a specified process. [E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) In the instant case, there is no reason to believe that distinct structure is imparted by the method by which the solder is applied to the paste electrode, and the Examiner maintains that the structure taught by the combination of references above is the same as that instantly claimed.

10. Claims 1-3, 8-13, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Needes (US 4,235,644) in view of Gonsiorawski et al.

Regarding claims 1, 8, and 9, Needes teaches a solar cell having an electrode made from a silver paste having powdery glass with an average grain size below 1 micrometer. (Column 2, lines 40-65; 2-10 micrometer preferred particle size; Examples)

Regarding claims 2, 10, 12, and 17, Needes teaches pastes having 3-12 % glass frit by weight. (Column 2, lines 53-55)

Needes does not explicitly disclose using a lead-free solder to make connections to the electrode made from the paste, nor do they explicitly disclose connection of plural cells by interconnectors to form the claimed string and module. Specific to claims 3, 11, 13, and 18, Needes does not teach any particular thickness of the silver paste electrodes. The Examiner notes that a means of connection to the cell electrodes is necessary for use of the power generated in the cell.

Gonsiorawski et al teach the advantage of using a 96-98 % tin/2-4 % silver solder to connect leads to electrodes made from fired silver paste, in that thermal stability of the resulting connections is improved. (Abstract, Column 3, lines 49-58, Column 4, lines 50-67) In addition, Gonsiorawski teach using such soldered connections to connect plural cells in strings and modules as claimed. (Column 1, lines 9-19; Column 4, lines 62-67)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Needes by specifically using a 96-98 % tin/2-4 % silver solder to connect leads the paste electrode, as taught by Gonsiorawski et al, because Gonsiorawski et al teach that use of this solder leads to improved thermal stability of the bonds. (Abstract; Column 3, lines 49-58)

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Needes by specifically using these connections to connect multiple cells in series strings to form solar modules, as taught by Gonsiorawski et al, because connection of cells in series

strings increases the output voltage, which is necessary for many conventional electrical loads. A skilled artisan would have known to select a suitable number of cells (Which have output voltages of less than 1 volt; e.g. Figure 2 of Yoshida et al) to be connected in series in order to provide whatever module output voltage is desired.

Undue weight cannot be given to the instant limitation to a paste electrode "which has been dip-coated" with lead-free solder, since this limitation is drawn to the making of the claimed product by a specified process. [E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) In the instant case, there is no reason to believe that distinct structure is imparted by the method by which the solder is applied to the paste electrode, and the Examiner maintains that the structure taught by the combination of references above is the same as that instantly claimed.

Specific to claims 3, 11, 13, and 18, it would further have been obvious to one having ordinary skill in the art to prepare electrodes over 15 micrometers thick, since a skilled artisan would recognize that the resistance of electrodes having this thickness would be lower than that of thinner electrodes, and would reasonable expect lower resistance losses in the cell. In addition, in *Gardner v.*

TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. There is no reason to expect significantly different cell performance based on the selection of electrode thickness.

Response to Arguments

11. Applicant's arguments filed 04 September 2007 have been fully considered but they are not persuasive.

Applicant argues that the newly added limitation to a paste electrode "which has been dip-coated" with lead-free solder distinguishes the claims from the applied prior art, arguing that Gonsiorawski et al teach away from dip coating. The Examiner respectfully points out that product-by process limitations carry weight only insofar as they define structure. In this case, there is no structure recited in the claims that is distinct from that taught by the art as combined in the rejections, and no reason to believe that distinct structure is imparted by a dip coating step, as opposed to any other method of applying the solder. As noted above, even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the

product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB
14 November 2007

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